

Digital News production at DR

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DR News

Since December 2000, DR has produced two news broadcasts daily, five days a week, in a purely digital environment – with no significant errors. The latest step consisted of taking a digital archiving solution into the news production environment.

This article evaluates the progress made throughout the project.

The overall objective of the DR project described here was to gain experience of digital production technologies and workflow. This small-scale project was to precede the upgrading of the entire organization from a tape-based environment to a digital environment. The focus was therefore on building a system that would test the concept and give DR the required experience for managing a full-scale installation.

The project started with an EU tender, covering a pilot project for a digital news production and archiving solution. A contract was signed, during the summer of 2000, with Silicon Graphics Inc. (SGI) as the main contractor.

Business environment

DR operates two nationwide television channels and four nationwide radio stations. DR also owns and operates several local radio stations. More than 3,000 employees contribute to the company's overall business. Because of the company's geographic location and size, the pilot project focused on the department that would be best able to test and benefit from a digital solution – a part of DR's television news department that broadcasts live, twice a day. DR specifically wished to provide the newsroom with a fully digital workflow for:

- **acquisition control**, supporting two levels of resolution;
- **asset management** (short- and long-term archiving);
- **indexing** and **logging** of video material;
- **browsing** and **editing** capabilities for video and audio material;
- **transmission automation** and **control**, including an interface to the news system.

DR also wished to integrate the new digital workflow with the existing computer-aided radio (CAR) solution – based on Dalet Digital Media Systems for transmitting and archiving audio materials – at its radio stations. Sharing the audio clips from video files would benefit the radio news producers, and access to radio audio files could similarly be leveraged by the television teams. This part of the project will be introduced during Spring 2002.

News production represents one of the most demanding broadcasting applications. Short deadlines, large quantities of information and a broad range of sources, pose many inherent challenges. The digital solution required an easy-to-use interface with quick-click operations for inputting, storing, retrieving and editing digitized video clips. The user interface also required capabilities for programming control and transmission automation.

An integration exercise

The project included designing the overall digital architecture, integrating the required multivendor technologies and developing project-specific software. The core component of the new solution – a comprehensive asset-management solution – was developed, based on SGI StudioCentral. The physical archive consists of:

- a fibre-channel storage area network that switches an Oracle database on a storage array disk system;
- an MPEG library of files on another system;
- an archive cache, using hierarchical storage management technology, and a StorageTek tape library on two systems.

The video is digitized in the DVCPRO / 25 Mbit/s format.

Once in digital format, video becomes a standard file, just like any other, and can be moved to and from the archive over a high-speed Gigabit Ethernet network. Transfer speeds range from five to six times that of real-time video rates, giving the newsroom team unprecedented throughput for handling large video files. Key technology components of the digital workflow include (*see Fig. 1*):

- **Telemedia encoders** for ingesting MPEG-1 data (video is also digitized from satellite feeds and standard VCRs).
- **Keyvia MediaWorks software**. PC-client software allows designated users to control the ingestion of video from any source, search through archived video, perform low-resolution pre-edits on digitized video before designating it for inclusion in an aired broadcast, or retrieve soft clips and move them to the editing station.
- **Panasonic QuickCutter editing stations** for non-linear editing. This is a dedicated station for editing DVCPRO high-resolution material; editors can specify voice-overs, transitions and other complex functions; edited clips are outputted to the transmission server.

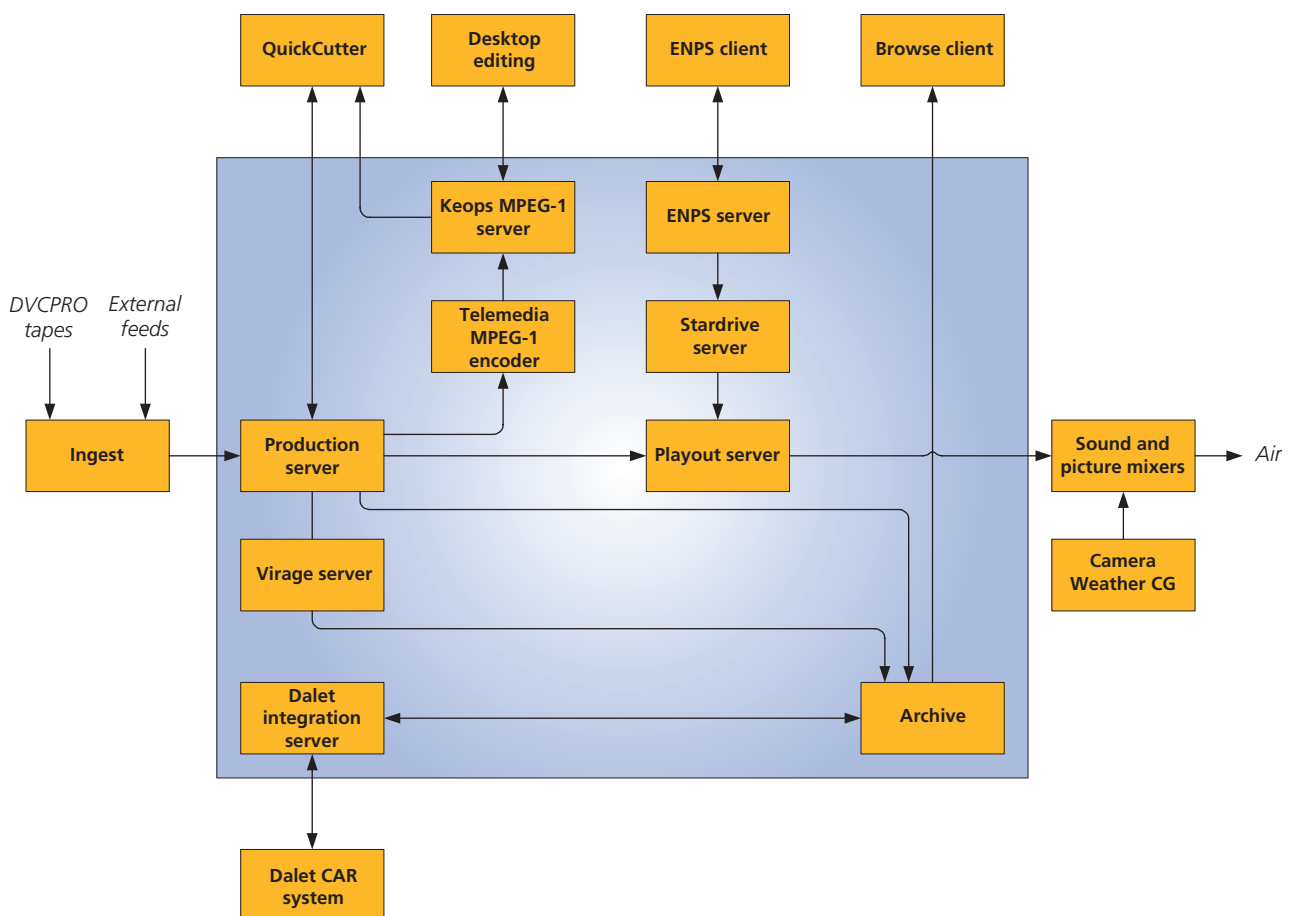


Figure 1
Key technology components of the digital workflow.

- **Fast Purple non-linear editing stations.** These were not part of the original concept but were added during the project. These editing stations are used for server-based editing of the high-resolution DVCPRO material over the network.
- Two parallel, redundant **SGI Origin transmission servers.**
- **ENPS newsroom computer system** for 10 simultaneous users involved in digital production.
- **A.N.N. Systems StarDrive transmission system.** This system automatically controls the complete playout process, broadcasting the data files set up on the transmission servers; integrates the newsroom automation system (ENPS) using the MOS2 protocol, and automatically updates the broadcast database when a clip arrives.

The digital workflow today

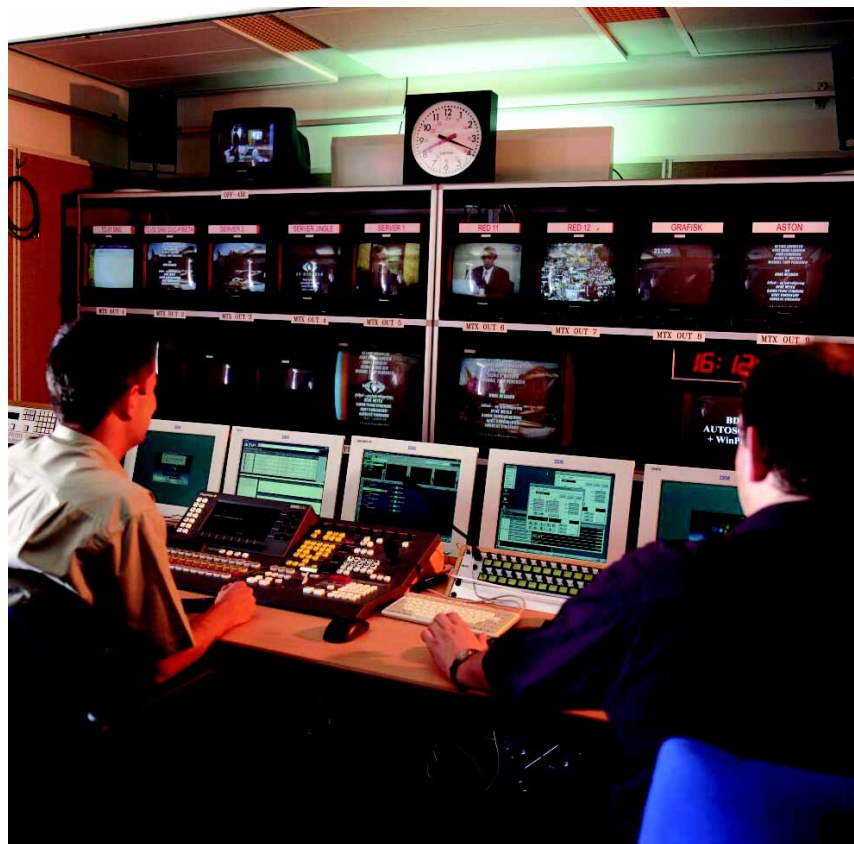
Today, newsroom journalists can control several operations directly from their own PC desktop: they can search for clips, view metadata, view clips of frame-accurate quality, and edit offline and archive-critical material. The user interface saves time during all these everyday tasks and allows journalists to maintain greater control over their productions. With low-resolution asset management capabilities on each desktop, journalists can pre-edit stories quickly and easily, even during airtime for late-breaking news. This also allows journalists to (i) quickly combine material from different original assets without using a non-linear editing (NLE) station, (ii) generate the most appropriate clip for each story and (iii) transfer the finished clip directly to the transmission servers.

When more elaborate editing is required, clips are easily moved to the QuickCutter NLE stations and then, when editing has been completed, over to the transmission servers.

High-resolution clips can move between the servers at speeds that are 5 to 15 times faster than real time. These rapid transfer rates mean that video clips can be retrieved and placed on the transmission server up to five minutes before airtime. The transmission automation software allows the production team to take advantage of this speed and flexibility, by viewing and changing the playlist at any time – even during broadcasts!

The digital workflow solution also allows DR to protect video assets, eliminating quality degradation, even when a clip is played on numerous occasions. Assets are accessible throughout the company and are easily located at any time.

With a web-based client, video clips can be viewed over the company's intranet. Users can search archives, locate assets and play the MPEG-1 version of the clip on a PC using standard tools (Windows MediaPlayer). A second client enhances archival workflow, making it easy for video clips from user desktops to be designated as archive assets.



General view of the control room built during the project. It is here that the producer monitors and controls the video streams from various servers.

Abbreviations

API	Application Programming Interface	IT	Information Technology
CAR	Computer-Aided Radio	MOS	Media Object Server
DR	<i>Danmarks Radio</i> (Denmark)	MPEG	Moving Picture Experts Group
ENG	Electronic News Gathering	NLE	Non-Linear Editing
EU	European Union	VCR	Video Cassette Recorder

Key experiences

DR's overall project objective has been achieved: valuable experience has been collected – both in dealing with a whole new technological framework and in organizing workflow to take full advantage of the technology.

Workflow and organization

Even though the installation covers only a small part of the complete news production site, DR can reach some key conclusions regarding workflow and organization.

Content-sharing is without doubt a key advantage in a digital environment. For example, DR has been able to produce an additional short news broadcast during the early hours of the morning, using the server-based content. Since content-sharing is no longer a technical issue, new challenges are emerging. A shift in behaviour is required among the journalists, since their stories and material are now instantly available within the whole organization. This raises the question of users' access rights, as anyone can access and re-use the content.

It is no surprise that implementing new technology calls for a change in user roles. One of the new job functions is media management, which basically consists of dealing with the incredible amount of video, audio and metadata stored on the servers. A serious approach to manual-purging procedures is obviously required to avoid full file systems and production disasters. Journalists and editors must also upgrade their level of IT competence. For example, those participating in the project have been trained in the "ingest" process and in desktop-editing, although this did not happen overnight. A long period of intense supervision was necessary to make them comfortable and efficient when using the equipment. As of today, approximately 50% of the broadcast is edited by journalists using their desktop PCs, while the remainder is edited on QuickCutter NLE by professional editors.

Desktop editing

Although the concept of journalists doing simple cut-editing on their normal desktops has proved to work well, there is still room for improvement. In particular, DR now considers voice-over functionality to be mandatory in the future. As it is now, the reporter is forced to do voice-overs in the dedicated NLE rooms. When this functionality is available at their desktops, more editing will take place without reporters leaving their desks.

DR is currently considering two options for the full-scale installation:

- frame-accurate low-resolution editing with a software product that supports voice-over and simple timeline functionality;
- server-based editing through the network, directly using the hi-resolution files which can provide more advanced editing functions such as voice-over and timeline on desktop PCs.

Ingest

An ingest channel is rather expensive and the maximum required number of simultaneous ingest sessions must therefore be determined. The two ingest channels chosen for this installation have, under certain conditions, proved to be a bottleneck. It is vital that material can be transferred to the server as soon as it is available.



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Before joining DR, Mr Lundberg worked with large-scale IT projects in the newspaper business, aiming to optimize editorial work-flow and content sharing. Since joining DR, he has been responsible for several IT and broadcast projects within the news organization – including research, planning, web content management and work on broadcast production systems.

Another restriction has been the real-time speed of the ingest process, which is dictated by the MPEG-1 encoding unit. If ENG tape arrives close to a deadline, the material is often acquired directly through the QuickCutter tape deck, which can accomplish the task in a quarter of the time. However, in these cases the material cannot be shared, which undermines the concept of content sharing.

Asset management system and archiving

A powerful asset management system has proved to be the core component of DR's digital production environment. StudioCentral manages the workflow, metadata structures, video files, user rights, etc., using an open API, which makes accessing the data easier for external applications.

The implementation of the archive workflow is transparent for users, as they can access the content whether it is stored on the tape robot or on the production server.

Metadata

Deciding on the metadata structure has proved to be a lengthy process. One challenge was that it should be possible to store metadata for both radio and TV content in the same structure. Another challenge was that putting content into the system should be quick and easy. DR eventually chose the Dublin Core standard as a metadata framework. At the moment, it seems to be a pragmatic solution that can support current needs, but DR will continue to investigate metadata standards for the full-scale project.

Video and audio logging

A great deal was expected of the video and audio logging software from Virage. The speech-to-text functionality was expected to produce metadata automatically, but as this functionality is unfortunately not available in the Danish language, results have been poor. However, keyframes extracted from the video stream seem to have a certain value when trying to identify a relevant archive clip.

What happens next?

The next big challenge for the digital installation is three hours of morning television a day, which will be produced on the new system and will start this winter. The system is currently being upgraded to support larger volumes of content.

Meanwhile, DR will invite an EU tender for a full-scale installation, covering the complete TV news, current affairs and sports production environments, at three different locations. The project is expected to be finished by the end of 2003 and will be based on the experience obtained from the pilot installation described here.